

# HERBIVOROUS INSECTS ASSOCIATED WITH THE PAPERBARK *MELALEUCA QUINQUENERVIA* AND ITS ALLIES: V. PYRALIDAE AND OTHER LEPIDOPTERA

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## Abstract

We conducted surveys in eastern Australia to detect potential agents for the biological control of *Melaleuca quinquenervia* in Florida, USA. This paper presents records for 26 Lepidoptera species (including 11 Pyralidae) from nine families collected and reared on *M. quinquenervia* and four of its allies. Two of these species warrant further study of their potential as biocontrol agents for *M. quinquenervia*.

## Introduction

*Melaleuca quinquenervia* (Cav.) S.T. Blake is an Australian tree that has become a serious economic and environmental pest in southern Florida. The problems associated with this tree in Florida and details of surveys to detect potential insect biological control agents in Australia were described in Balciunas *et al.* (1993a, in press). In four previous articles (Balciunas *et al.* 1993a, 1993b, 1995, Burrows *et al.* 1994), we presented collection and rearing records for 94 Lepidoptera species belonging to the Noctuoidea, Geometridae, Gelechioidea and Tortricidae. This paper, the fifth and final in our Lepidoptera series, presents records for 11 species of Pyralidae and 15 species from eight other Lepidoptera families reared from larvae or pupae collected on *Melaleuca* species.

## Methods

Collection methods were described in Balciunas *et al.* (1993a). All Lepidoptera recorded in this paper were collected and reared on *M. quinquenervia* or one of four of its close relatives: *M. dealbata* S.T. Blake; *M. "fluviatilis"*; *M. leucadendra* (L.) L. or *M. viridiflora* Sol. ex Gaertner between 1986 and 1994. *Melaleuca "fluviatilis"*, referred to as *M. new sp.* A in our earlier papers (Balciunas *et al.* 1993a, 1993b), has not been described formally but is already in use in the literature (Barlow 1988). For two moth species, we also include records from *Callistemon viminalis* G. Don ex Loudon and *Lophostemon suaveolens* (Gaertner) P.G. Wilson & Waterhouse. The larvae were reared on the tree species from which they were collected. One of the authors (E.D. Edwards) identified the adults (except *Cryptoblabes* nr. *adoceta* which was identified by M. Horak) and staff of the Australian

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Table 1. Pyralidae and other Lepidoptera species reared from *Melaleuca quinquenervia* and six other myrtaceous tree species.

Family and Species	Collection Site	Host Plant <sup>1</sup>	Stage and No. Collected	Date Collected	Plant Part Fed Upon	Life-history information pp = pupal period	
Eupterotidae	Forrest Beach Swamp	Mgn	3 larvae	12.x.93	Leaves	2 adult ♂ em. 13.xiii.93-7.ii.94, pp=40 d	
	Forrest Beach West	Mgn	Larva	9.xi.93	Leaves	Adult ♀ emerged 21.xii.93	
Colana serranoiata (Lucas)	Murrigal	Lsv	Larva	5.xi.93	Leaves	Adult ♀ emerged	
	James Cook University	Mgn	Larvae	2.viii.89	Leaves	4 adults emerged	
Gracillariidae	James Cook University	Mgn	Larva	18.vii.91	Leaves	Adult emerged	
	James Cook University	Mgn	Larva	15.viii.91	Leaves	Adult emerged	
	James Cook University	Mgn	Larvae	14.ii.92	Leaves	2 adults emerged	
	James Cook University	Mgn	Pupa	12.iii.92		Adult emerged	
	James Cook University	Mgn	Pupa	11.iii.94		Adult emerged 26.iii.94	
	James Cook University	Mgn	Larva	25.iii.94	Leaves	Adult emerged 4.iv.94	
	James Cook University	Mgn	Pupa	22.iv.94		Adult emerged 3.v.94	
	Immiidae	Coolium	Mgn	Larva	7.iii.94	Leaves	Adult emerged
		Forrest Beach West	Mgn	Larva	12.ix.92	Leaves	Adult emerged 27.ix.92, pp=10 d
		Forrest Beach West	Mgn	Larva	23.iii.93	Leaves	Adult emerged 10.iv.93
Hyde Park Shopping Centre		Mlb	Larva	21.vi.90	Leaves	Adult emerged 28.vi.90	
Roves Bay Lions Park		Mdl	Larva	27.iv.92	Leaves	Adult emerged 13.v.92, pp= 8 d	
Sherwood		M?vr	Larva	21.ii.94	Leaves	Adult emerged	
Willows Shopping Centre		Mgn	Pupa	17.v.92		Adult emerged 23.v.92	
Wulgurn		Mlb	Larva	3.iv.91	Leaves	Adult emerged 24.iii.91, pp=9 d	
Lasiocampidae		Chelmer	Mgn	Larva	9.ix.91	Leaves	Adult emerged
		Brb'ie Island Road	Mgn	Larva	27.i.87	Leaves	Adult emerged
	Greenbank	Mgn	Larva	8.xi.89	Leaves	Adult emerged 1.xii.89, pp=11 d	
	Entometa sp.	Porela arida (Walker) <sup>2</sup>					

James Cook University	Mqn	Pupa	22.i.92	Leaves	Adult emerged 31.i.92
James Cook University	Mqn	Larva	13.ii.92	Leaves	Adult emerged 7.iv.92, pp=12 d
James Cook University	Mqn	Pupa	21.x.93	Leaves	Adult emerged 22.x.93
Indooroopilly	Mqn	7 larvae	28.ii.92	Leaves	4 adults emerged 12.iii.92, pp=9-10 d
Indooroopilly	Mqn	Larva	4.iv.92	Leaves	Adult emerged 29.iv.92, pp=13 d
Morayfield	Mqn	Larva	21.vi.93	Leaves	Adult emerged 12.vii.93, pp=13 d
Nathan Plaza	Mqn	Larva	5.iii.91	Leaves	Adult emerged
Nathan Plaza	Mqn	Larva	5.ii.92	Leaves	Adult emerged
Pallaranda Retirement Home	Mlb	Larva	16.v.90	Leaves	Adult emerged 13.vii.90, pp=21 d
Taringa	Mqn	Larva	19.ii.87	Leaves	Adult emerged
Willows Shopping Centre	Mqn	Larva	18.i.93	Leaves	Adult emerged 11.ii.93, pp=17 d
Willows Shopping Centre	Mqn	Larva	16.iv.93	Leaves	Adult emerged 17.v.93
Woodward Park	Mqn	2 larvae	25.x.93	Leaves	2 adults emerged 27.xii.93
Barrett's Lagoon	Mqn	Larva	12.iii.91	Leaves	Adult emerged 23.iv.91
Forest Beach West	Mqn	Larva	12.ix.92	Leaves	Adult emerged 2.x.92, pp=14 d
Murrigal	Mqn	Larva	4.xi.93	Leaves	Adult emerged
Ross River	Mlb	Larva	5.x.87	Leaves	Adult emerged
Angus Smith Drive	Mvr	3 larvae	24.iii.94	Leaves	2 adults emerged
Willows Shopping Centre	Mqn	Larva	18.iii.91	Leaves	Adult emerged 27.iii.91, pp=8 d
Forest Beach West	Mqn	Pupa	30.v.88	Leaves	Adult emerged 1.vii.88
James Cook University	Mvr	3 pupae	29.iii.92	Leaves	2 adults emerged 2-23.v.92
Hyde Park Shopping Centre	Mfl	Larva	7.xi.94	Leaves	Adult emerged 17.xii.94, pp=37 d
Forest Beach West	Mqn	Pupa	9.vi.92	Leaves	Adult emerged 2.vii.92
Keelbottom Creek	Mfl	Pupa	9.iii.87	Leaves	Adult emerged 15.iii.87
Pallaranda Retirement Home	Mqn	Pupa	12.xii.89	Leaves	Adult emerged 15.xii.89
Rowes Bay Golf Course	Mqn	Pupa	6.xi.89	Leaves	Adult emerged 16.xi.89
Double Barrel Creek	Mqn	Larva	5.xii.89	Leaves	Adult emerged
<i>Arhopala centaurus</i> (Fabricius) <sup>4</sup>					
<b>Lycaenidae</b>					
<i>Pygmaeomorpha ocularis</i> (Lucas)					
<i>Doratifera</i> sp. C (Lewin) <sup>3</sup>					
<i>Doratifera vulherans</i>					
<i>Comana corones</i> (Fabricius)					
<b>Limacodidae</b>					
<i>Porela</i> sp. B					

Table 1 (cont.). Pyralidae and other Lepidoptera species reared from *Melaleuca quinquenervia* and eight other myrtaceous tree species.

Species	Collection site	Host	Stage and number collected	Date	Plant part	Life history information (pp=pupal period)
Psychidae	Centenary Park	Mgn Larva	22.iii.88	Leaves	Adult emerged 25.v.88	
<i>Hyalarcia</i> sp.	Centenary Park	Mgn Larva	9.i.94	Leaves	Died as a larva	
Undet. Psychidae sp. B	Centenary Park	Mgn Larva	6.x.94	Leaves	Adult emerged	
Pyralidae	James Cook University	Mgn Pupa	22.vii.91	Flowers	Adult emerged 2.ix.91	
<i>Addyge</i> cf. <i>defiguratus</i> (Walker)	Feluga Site 3	Mgn Larva	20.v.92	Flowers	Adult emerged	
<i>Agrotia amathealis</i> (Walker) <sup>5</sup>	Berrimah	Mvr Larva	19.iv.93	Leaves	Adult emerged	
Doolandella	Feluga Site 1	Mgn Larva	8.iii.88	Leaves	Adult emerged 14.iv.88, pp=16 d	
Forrest Beach Swamp	Forrest Beach Swamp	Mgn Larva	31.viii.92	Tip-binder	Adult emerged 26.ix.92	
Forrest Beach Swamp	Forrest Beach Swamp	Mgn Larva	29.ix.92	Tip-binder	Adult emerged 24.x.92	
Tip-binder	Tip-binder	Mgn Larva	4.xi.93	Tip-binder	Adult emerged 1.xii.93, pp=8 d	
James Cook University	James Cook University	Mgn Larva	18.vii.91	Leaf-binder	Adult emerged 5.viii.91, pp=12 d	
James Cook University	James Cook University	Mgn Larva	27.ii.92	Tip-binder	Adult emerged 10.iii.92, pp=10 d	
James Cook University	James Cook University	Mgn Larva	11.iii.94	Tip-binder	Adult emerged 27.iii.94	
James Cook University	James Cook University	Mgn Larva	25.iii.94	Tip-binder	Adult emerged 24.iv.94	
Murrigal	Murrigal	Mgn Larva	23.viii.93	Tip-binder	Adult emerged 9.ix.93	
Murrigal	Murrigal	Mgn Larva	12.x.93	Tip-binder	Adult emerged 13.xi.93, pp=8 d	
Mvr 2 larvae	Murrigal	Mvr 2 larvae	12.x.93	Tip-binder	2 adults em. 5-9.xi.93, pp=8-12 d	
Woodward Park	Woodward Park	Mgn Larva	3.ix.92	Tip-binder	Adult emerged 24.ix.92, pp=9 d	
Centenary Park	Centenary Park	Mgn Larva	3.v.93	Leaves	Adult emerged	
Burpengary	Burpengary	Mgn Larva	12.iv.88	Flowers	Adult emerged	
Byron Bay	Byron Bay	Mgn Larva	17.iv.88	Flowers	Adult emerged	
Centenary Park	Centenary Park	Mgn 2 larvae	28.v.94	Flowers	2 ad. em. 10.vi&14.vii.94, pp = 11 d	
Edmund Kennedy Nat. Park	Edmund Kennedy Nat. Park	Mgn Larva	11.vii.88	Leaves	Adult emerged 5.viii.88	

*Cathyalia fulvella* Ragonot  
*Cryptoblabes* nr. *adoceta*  
Turner

Mission Beach Road	Mqn	2 larvae	16.ii.92	Flowers	2 adults emerged 8-15.iii.92
The Pines	Mqn	Larva	10.iv.88	Flowers	Adult emerged 6.v.88, pp=17 d
Woodward Park	Mqn	Pupa	3.ix.92	Flowers	Adult emerged from flowers 15.ix.92
Five Mile Creek	Mlb	Larva	2.vi.87	Fruit	2 adults emerged 30.vii.2.viii.87
Indooroopilly <sup>6</sup>	Mqn	Larvae	17.xi.89	Leaves	4 adults em. 16-18.xiii.89, pp=22-24 d
Stapylion	Mqn	Larva	1.viii.89	Tip-binder	Adult emerged 6.ix.89, pp=19 d
James Cook University	Mqn	Larva	11.iii.94	Leaf-binder	Adult emerged 22.v.94
Acacia Ridge	Mqn	Larva	9.iii.87	Flowers	Adult emerged
Aspley	Mqn	Larvae	29.iii.88	Flowers	2 adults em. 16-17.iii.88, pp=12-13 d
Boundary Street	Mdl	8	20.v.92	Flowers	Adult emerged 28.v.92
Boundary Street	Mdl	Larvae	19.v.93	Flowers	3 adults emerged
Burdekin River	Cvm	Larvae	24.x.94	Flowers	2 adults em. 12-23.xi.94, pp=11 d
Burpengary	Mqn	Larvae	8.iii.89	Flowers	Adult emerged 5.iv.89, pp=16 d
Cardwell Swamp	Mqn	Larvae	11.vii.88	Flowers	9 adults emerged 31.vii.-3.viii.88
Centenary Park	Mqn	Larva	3.v.93	Flowers	Adult emerged 28.v.93, pp=7 d
Eubanagee Swamp	Mqn	2 larvae	25.v.87	Flowers	2 adults emerged
Eubanagee Swamp	Mqn	8 larvae	6.v.88	Flowers	Adult emerged 2.vi.88
Feluga Site 1	Mqn	3 larvae	15.vi.88	Flowers	2 adults emerged 4-6.vii.87
Five Mile Creek	Mlb	Larvae	2.vi.87	Flowers	15 adults em. 21-25.vi.87, pp=9-10 d
Forrest Beach West	Mqn	Larva	30.v.88	Flowers	Adult emerged 27.vi.88
Forrest Beach West	Mqn	Larvae	10.v.94	Flowers	Adult emerged 14.vi.94
Gailes	Mqn	Larva	4.iii.87	Flowers	Adult emerged
Good Sheperd Hospice	Mdl	Larvae	21.ix.93	Flowers	2 adults em. 4-12.x.93, pp=7-10 d
James Cook University	Mqn	8	1.vi.87	Flowers	Adult emerged
James Cook University	Mvr	8	11.vi.87	Flowers	Adult emerged 25.vi.87
James Cook University	Cvm	Larva	2.xi.93	Flowers	Adult emerged
Pallarenda Retirement Home	Mqn	3 larvae	25.vii.90	Flowers	Adult emerged 11.ix.90
Pallarenda Retirement Home	Mvr	Larva	2.vi.92	Flowers	Adult emerged 18.vi.92
Pallarenda Retirement Home	Mvr	Larvae	9.vi.93	Flowers	Adult emerged 6.vii.93, pp=13 d
Palm Beach	Mqn	Larva	13.iii.88	Flowers	Adult emerged
Pottsville	Mqn	4 larvae	20.iii.90	Flowers	Adult emerged 4.iv.90, pp=7 d

*Endorhiza mesenterialis* (Walker)*Orithaga thyrsoalis* (Walker)<sup>6</sup>*Salma pyrrastis* (Meyrick)*Synonarcha irastis* (Meyrick)<sup>7</sup>

Table 1 (cont.). Pyralidae and other Lepidoptera species reared from *Melaleuca quinqueveneria* and eight other myrtaceous tree species.

Species	Collection site	Host Plant	Stage and Date collected	Plant part collected	Life history information (pp=pupal period)	
<i>Syntomarcha irasitis</i> (Meyrick) <sup>7</sup>	Murray River Swamp	Mvr Larvae	5.iv.88	Flowers	6 adults em. 25-29.iv.88, pp=11 d	
	Railway Avenue	Cym Larvae	23.viii.94	Flowers	3 adults emerged 18-20.ix.94	
	Sherwood	Mqn Larvae	22.ii.88	Flowers	2 adults em. 13-18.iii.88, pp=7-18 d	
	Sunnybank	Mqn Larva	6.iv.88	Flowers	Adult emerged	
	Three Mile Creek	Mlb Larva	25.vii.90	Tip-binder	Adult emerged 11.ix.90	
	Willows Shopping Centre	Mqn Larva	16.viii.92	Flowers	Adult emerged 11.ix.92, pp=9 d	
	Willows Shopping Centre	Mqn Larvae	18.i.93	Flowers	4 adults emerged 27.i.-7.ii.93	
	Willows Shopping Centre	Mqn Larvae	19.v.93	Flowers	3 adults emerged	
	Woodward Park	Mqn 2 larvae	13.vii.87	Flowers	2 adults emerged 2-10.viii.87	
	Woodward Park	Mqn 2 larvae	15.vi.88	Flowers	2 adults emerged 7-8.viii.88	
<i>Syntomarcha vulnerata</i> (Lucas)	Acacia Ridge	Mqn 4 larvae	9.iii.87	Flowers	4 adults emerged	
	Aspley	Mqn Larva	7.iv.87	Flowers	Adult emerged	
	Aspley	Mqn 3 larvae	29.ii.88	Flowers	Adult emerged 16.iii.88, pp=12 d	
	Cardwell Swamp	Mqn Larva	1.vii.88	Flowers	Adult emerged 31.vii.88	
	Double Barrel Creek	Mqn 2 larvae, Pupa	11.v.93	Flowers	2 adults emerged 27-28.v.93	
	Edmund Kennedy Nat. Park	Mqn Larva	6.v.88	Flowers	Adult emerged	
	Feluga Site 2	Mqn Larva	28.v.91	Flowers	Adult emerged 24.vi.91	
	Feluga Site 3	Mqn Larva	6.viii.90	Flowers	Adult emerged 31.viii.90	
	Forrest Beach West	Mqn Larva	8.vi.88	Flowers	Adult emerged	
	Mission Beach Road	Mvr 4 larvae	16.ii.92	Flowers	4 adults em. 4-5.iii.92, pp=7-11 d	
<i>Caniposo poliochyta</i> (Turner) <sup>8</sup>	Pottsville	Mqn Larva	20.iii.90	Flowers	Adult emerged 24.iv.90, pp=19 d	
	Forrest Beach West	Mdl Pupa	1.viii.89	Flowers	Adult emerged 18.ix.89	
	Forrest Beach Swamp	Mlb Larva	23.iii.93	Leaves	Adult emerged 6.v.93, pp=9 d	
	Angus Smith Drive	Mqn 7 pupae	31.i.88	Leaves	7 adults emerged 5-10.ii.88	
	Barrett's Lagoon	Mqn 7 larvae	12.iii.91	Leaves	3 adults em 23.iv.-5.v.91, pp=21-28 d	
	<i>Polipascchia lithochlora</i>	(Lower)				

Tineidae		Metapherna sp.		Bribie Island Road	
Mqn	Larva	12.iii.91	Leaves	Adult emerged 1.v.91	
Mqn	7 larvae	12.x.93	Leaves	7 adults emerged 28.xi.-20.xii.93	
Mqn	3 larvae	8.iii.94	Leaves	3 adults emerged 20.iv.-17.vi.94	
Mqn	4 larvae	4.xi.93	Leaves	3 adults emerged by 3.i.94	
Mqn	8 larvae	31.viii.92	Leaves	7 adults emerged 4.x.-9.xi.92	
Mqn	Larva	7.v.92	Leaves	Adult emerged	
Mdl	5 larvae	1.iv.93	Leaves	5 adults emerged 3.xii.93-1.i.94	
Mqn	10 larvae	8.iii.94	Leaves	4 adults emerged 29.v.-8.vii.94	
Mdl	11 larvae	4.xi.93	Leaves	9 adults emerged 27.i.-2.iv.94	
Mqn	12 larvae	9.xi.93	Leaves	11 adults emerged 13.i.-10.iii.94	
Mlb	Larva	9.xi.93	Leaves	Adult emerged	
Mqn	6 larvae	8.iii.94	Leaves	3 adults emerged 8-15.vi.94	
Mqn	2 larvae	31.viii.94	Leaves	Adult emerged 9.x.94	

1 Cym = *Callistemon viminalis*, Lsv = *Lophostemon suaveolens*, Mdl = *Melaleuca dealbata*, Mlb = *M. fluviatilis*, Mlb = *M. leucadendra*, Mqn = *M. quinqueneria*, Mvt = *M. viridiflora*.  
 2 *Foreia arida* larvae are recorded to feed on *Eugenia*, *Kunzea ambigua*, *Leptospermum flavescens*, *Lophostemon confertus*, *M. armillaris* and *M. quinqueneria* (all Myrtaceae) (Common 1990).  
 3 *Doratifera vulnervans* occurs from southern Queensland to south-western Australia and feeds on *Melaleuca* and other Myrtaceae (Common 1990).  
 4 *Arhopala centaurus* has also been recorded from *Eucalyptus intermedia* and *M. quinqueneria* (Quirk 1974).  
 5 *Agrotera amathalis* has also been recorded from *Eucalyptus tereticornis* (White and Peters 1993).  
 6 *Orhaga thyrallis* has also been recorded from *Eucalyptus grandis*, *E. pilularis* and *E. saligna* Moore (1972), and from *Angophora*, *Lophostemon*, *Melaleuca*, *Psidium* (all Myrtaceae) and *Prunus* (Rosaceae) (Common 1990).  
 7 *Syntonarcha triastis* is widely distributed from northern Australia to southeastern and southwestern Australia (Common 1990), and has been recorded from the flowers and young foliage of a small-leaved *Melaleuca* (Turner 1904).  
 8 Adults emerged from flowers, may have been collected as larvae or pupae.  
 9 *Titanoceros poliochrya* larvae are reported to gregariously feed on *Melaleuca leucadendra* leaves fastened together with silk (Turner 1904).

Biological Control Laboratory (ABCL) associated the larvae with the identified adults. A representative series of specimens will be held at the ABCL, while the remaining specimens will be deposited at the Australian National Insect Collection (ANIC) in Canberra.

Our collecting was concentrated in two coastal areas, from the Daintree River, north of Cairns, to Townsville; and from Coolumb in southeastern Queensland to Grafton in northern New South Wales. We also occasionally sampled sites outside these areas in Queensland, NSW and the Northern Territory. Most of the site locations in this paper have been listed in previous papers in this series (Balciunas *et al.* 1993a, 1993b, 1995, Burrows *et al.* 1994). Sites listed for the first time are: **Acacia Ridge** (27°35.4'S 153°01.5'E), Brisbane; **Boundary Street\*** (19°16.4'S 146°48.7'E), Townsville; **Burdekin River** (19°26.4'S 145°51.6'E), 92 km SSW of Ingham; **Greenbank\*** (27°42.5'S 153°00.1'E), Brisbane; **Mission Beach Road** (17°55.2'S 145°56.7'E), 2.5 km NE of Tully; **Murray River Swamp** (18°02.6'S 145°54.9'E), 12.5 km S of Tully; **Nathan Plaza\*** (19°18.0'S 146°45.6'E), Townsville; **Railway Avenue\*** (19°16.9'S 146°48.8'E), Townsville; **Ten Mile Creek** (20°15.6'S 148°28.0'E), 36 km SE of Bowen; and **Wulguru\*** (19°19.7'S 146°48.6'E), Townsville. Sites marked with an asterix (\*) are either ornamental plantings or forest remnants in urban areas.

## Results

Collection and rearing records for all lepidopteran species in this paper are presented in Table 1.

## Discussion

From our literature searches, only two species presented in this paper (*Arhopala centaurus* and *Porela arida*), have been recorded previously from *M. quinquenervia*. Four others: *Doratifera vulnerans* and *Orthaga thyrsalis* (Common 1990); *Syntonarcha iriastis* and *Canipsa poliochyta* (Turner 1904) have been recorded from *Melaleuca*, although only in the case of *C. poliochyta*, which was reared from *M. leucadendron* [sic] (Turner 1904), was the *Melaleuca* species involved identified. The remaining host records appear to be new and for several species are the first published.

Among Lepidoptera, the Pyralidae are the most commonly used biocontrol agents for weeds (Julien 1992). The most promising *Melaleuca* biocontrol agent from the species listed in this paper is the pyralid, *Poliopaschia lithochlora* (Lower) (referred to as *Epipaschia* sp. B in Balciunas *et al.* in press). The larvae of this species live communally in small colonies characterised by a system of tubes and small branches bound together. Leaves on the bound branches are then consumed by the larvae. Up to 12 larvae have been found in a single colony. Results of laboratory larval feeding tests have indicated a broad host-range, but surveys of tree species



occurring at some of our field sites have found this moth species only on closely related *Melaleuca* species. This moth species has been found on many occasions on *Melaleuca* spp. trees outside our shadehouse, but not on any of the numerous other tree species present there. In order to further develop this species as a biocontrol agent, more field investigation will be required to elucidate its field host-range.

Another species which shows some potential as a biological control agent for *M. quinquenervia* is the ?*Acrocercops* sp. leaf miner, whose feeding separates the cuticle from the leaf to form "blister" mines. These mines do not appear to have any detrimental effects upon the leaves until the cuticle is perforated, at which time the leaf rapidly dehydrates, resulting in leaf drop. These moths complete their entire four week life-cycle, including pupation, on one leaf. They were rarely observed in the field but occasionally have been abundant on potted *M. quinquenervia* (both inside and outside our shadehouse) at James Cook University. Surveys of tree species at this shadehouse have found the characteristic "blister" mines only upon *Melaleuca* species.

The five papers in this series have presented our collection and rearing records for 118 Lepidoptera species, including 95 from *M. quinquenervia*, upon which most of our collecting effort was focused. All are moths, except for a single butterfly species, *Arhopala centaurus*. Our studies have substantially increased the number of Lepidoptera known from *Melaleuca* species. McFarland (1979) listed 16 moth species with *Melaleuca* hosts, while Common (1990, Appendix B) listed a further 10 species. Although *Melaleuca* is the third most diverse angiosperm genus in Australia (behind *Acacia* and *Eucalyptus*), comparatively few Lepidoptera have been recorded from it previously. For example, Common (1990, Appendix B) lists 22 plant genera that have an equal or greater number of herbivorous moths known from them. This series of papers has redressed this imbalance, demonstrating the rich moth fauna of *Melaleuca* species, and highlighting how much more work is required to document hosts of Australian Lepidoptera.

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8	<i>Australian Entomologist</i> 23 (1) April 1996	
10	<i>Australian Entomologist</i> 23 (1) April 1996	
12	<i>Australian Entomologist</i> 23 (1) April 1996	
<i>Australian Entomologist</i> 23 (1) April 1996		9
<i>Australian Entomologist</i> 23 (1) April 1996		11
<i>Australian Entomologist</i> 23 (1) April 1996		13